IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Shilin Chen
Serial No.:	To be Assigned
Filing Date:	January 28, 2004
Group Art Unit:	To be Assigned
Examiner:	To be Assigned
Title:	**FORCE-BALANCED ROLLER-CONE BITS, SYSTEMS, DRILLING METHODS, AND DESIGN METHODS**

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

STATEMENT OF SPECIFICATION SUPPORT FOR CLAIMS

Applicant submits this Statement of Specification Support for Claims to indicate certain portions of the specification of the present Application that support Claims 1-28.

REMARKS

Applicant notes that Claims 1-28 correspond to claims appearing in U.K. Patent Applications with publication numbers GB 2360304, published September 19, 2001 (the "GB '304 Application"), GB 2370059, published June 19, 2002 (the "GB '059 Application"), and GB 2370060, published June 19, 2002 (the "GB '060 Application). The GB '304 Application is attached hereto as **Exhibit B**, the GB '059 Application is attached hereto as **Exhibit C** and the GB '060 Application is attached hereto as **Exhibit D**.

Specifically, Claims 1-2, 10-11 and 14-15 of the present Application copy Claims 1-2, 10-11 and 14-15, respectively, of the GB '304 Application. Claims 3-4 and 12-13 of the present Application copy substantial portions of Claims 3-4 and 12-13, respectively, of the GB '304 Application. Claims 5-7, 16-18 and 20-21 of the present Application copy Claims 5-7, 16-18 and 20-21, respectively, of the GB '304 Application and Claims 1-3, 6-8 and 10-11, respectively, of the GB '059 Application. Claims 8-9 and 19 of the present Application copy substantial portions of Claims 8-9 and 19, respectively, of the GB '304 Application and Claims 4-5 and 9, respectively, of the GB '059 Application. Claims 22-27 of the present Application copy Claims 22-27, respectively, of the GB '304 Application and Claims 1-6, respectively, of the GB '060 Application. Claim 28 of the present Application copies substantial portions of Claim 28 of the GB '304 Application and Claim 7 of the GB '060 Application.

The GB '304 Application, the GB '059 Application and the GB '060 Application each claims priority to U.S. Patent Application Serial No. 09/524,088 filed March 13, 2000 (now U.S. Patent No. 6,516,293) and to U.S. Patent Application Serial No. 09/635,116 filed August 9, 2000. Applicant notes that there may be other issued patents and/or pending applications that may claim similar or identical subject matter. To the extent that any issued U.S. patents or pending applications include claims directed to the same subject matter as the present Application, Applicant respectfully requests that an interference be declared between the present Application and such U.S. patents or pending applications.

The present Application is a continuation from U.S. Patent Application Serial No. 10/383,805 (the "'805 Application"), filed March 8, 2003, which is a continuation from U.S. Patent Application Serial No. 09/833,016 (the "'016 Application"), filed April 10, 2001, which is a continuation of U.S. Patent Application Serial No. 09/387,737 (the "'737 Application"), filed August 31, 1999, now U.S. Patent No. 6,213,225. The present Application also claims priority under 35 U.S.C. 119(e) based on provisional application No. 60/098,466 filed August 31, 1998.

Applicant respectfully contends that Claims 1-28 of the present Application are fully supported by the specification of the present Application, as originally filed. Applicant provides below, examples of specific portions of the specification that support specific claim limitations of Claims 1-28. Applicant does not intend this list to be exhaustive of all support for Claims 1-28 that is present in the specification of the present Application.

For the convenience of the Examiner, Applicant has reproduced specific portions of the specification of the present Application in the attached **Exhibit A**. Such portions were reproduced from the cited "Support in the Specification" below and are applied to their respective claim limitations in **Exhibit A**.

Claims	**Support in the Specification**
1. A method for determining an axial force acting on each one of a plurality of roller cones on a roller cone drill bit during drilling, comprising:	Page 11, line 7 – Page 12, line 17.
calculating, from a geometry of cutting elements on each of the roller cones and an earth formation being drilled by the drill bit, an axial force acting on each of the cutting elements;	Page 11, lines 7-29.
incrementally rotating the bit and recalculating the axial forces acting on each of the cutting elements;	Page 12, lines 3-14.

Claims	Support in the Specification
repeating the incrementally rotating and recalculating for a selected number of incremental rotations; and	Page 12, lines 18-21.
combining the axial force acting on the cutting elements on each one of the roller cones.	Page 12, lines 15-17.
2. The method as defined in Claim 1 wherein the axial force acting on each of the cutting elements totals an axial force applied to the drill bit.	Page 11, lines 7-8. Page 12, lines 15-17. Page 13, lines 2-4.
3. The method of Claim 2 further comprising determining an axial force acting on each of the cutting elements with respect to a predetermined relationship between depth of penetration and axial force applied for the cutting element geometry and the earth formation.	Page 11, lines 7-24.
4. The method of Claim 3 wherein the predetermined relationship is determined by laboratory experiment.	Page 11, lines 7-24.
5. A method for determining a volume of formation cut by each one of a plurality of roller cones on a drill bit drilling in earth formations, comprising:	Page 14, lines 12-16. Page 15, line 1.
selecting bit design parameters, comprising at least a geometry of a cutting element on the drill bit;	Page 13, line 28 – Page 14, line 2.
selecting an earth formation;	Page 11, lines 14-25.
calculating from the selected bit design parameters and the selected earth formation, parameters for a crater formed when each one of a plurality of cutting elements on each of the roller cones contacts the earth formation, the parameters including at least a volume of the crater;	*See* U.S. Patent Application No. 10/383,805 ("'805 Application")[1], Page 27, lines 8-9. *See* U.S. Provisional Application 60/098,466 ("'466 Provisional")[2], Flowchart.

[1] The '805 Application is the application from which the present Application is a continuation.

Claims	Support in the Specification
incrementally rotating the bit, and repeating the calculating of the crater parameters for a selected number of incremental rotations; and	Page 12, lines 3-14. Page 15, line 26 – Page 16, line 4.
combining the volume of each crater formed by each of the cutting elements on each of the roller cones to determine the volume of formation cut by each of the roller cones.	Page 14, line 29 – Page 15, line 1. Page 17, lines 17-20.
6. The method as defined in Claim 5 wherein the volume of each of the craters is determined by:	
determining an axial force on each of the cutting elements;	Page 11, line 14 – Page 12, line 2.
calculating, from the axial force on each of the cutting elements, an expected depth of penetration and projected area of contact between each of the cutting elements and the earth formation; and	Page 12, lines 11-14.
calculating the volume of each of the craters from the expected depth of penetration and projected area of contact.	Page 14, lines 11-16.
7. The method as defined in Claim 6 further wherein the axial force acting on each of the cutting elements totals an axial force applied to the drill bit.	Page 11, lines 7-8. Page 12, lines 15-17. Page 13, lines 2-4.
8. The method of Claim 7 further comprising determining an axial force acting on each of the cutting elements with respect to a predetermined relationship between depth of penetration and axial force applied for the cutting element geometry and the earth formation.	Page 11, lines 7-24.

[2] The '466 Provisional is incorporated by reference into the present Application. *See* Present Application, Page 1, lines 7-8.

Claims	Support in the Specification
9. The method of Claim 8 wherein the predetermined relationship is determined by laboratory experiment.	Page 11, lines 7-24.
10. A method for balancing axial forces acting on each one of a plurality of roller cones on a roller cone drill bit during drilling, comprising:	Page 7, line 32 – Page 8, line 2. Page 13, line 28 – Page 16, line 4.
calculating, from a geometry of cutting elements on each of the roller cones and an earth formation being drilled by the drill bit, an axial force acting on each of the cutting elements;	Page 11, lines 7-29.
incrementally rotating the bit and recalculating the axial forces acting on each of the cutting elements;	Page 12, lines 3-14.
repeating the incrementally rotating and recalculating for a selected number of incremental rotations;	Page 12, lines 18-21.
combining the axial force acting on the cutting elements on each one of the roller cones; and	Page 12, lines 15-17.
adjusting at least one bit design parameter, and repeating the calculating the axial force, incrementally rotating and combining the axial force, until a difference between the combined axial force on each one of the roller cones is less than a difference between the combined axial force determined prior to adjusting the at least one initial design parameter.	Page 12, line 27 – Page 13, line 13. Page 15, line 29 – Page 16, line 4. Page 17, line 30 – Page 18, line 2.
11. The method as defined in Claim 10 wherein the axial force acting on each of the cutting elements totals an axial force applied to the drill bit.	Page 11, lines 7-8. Page 12, lines 15-17. Page 13, lines 2-4.

Claims	Support in the Specification
12. The method of Claim 11 further comprising determining an axial force acting on each of the cutting elements with respect to a predetermined relationship between depth of penetration and axial force applied for the cutting element geometry and the earth formation.	Page 11, lines 7-24.
13. The method of Claim 12 wherein the predetermined relationship is determined by laboratory experiment.	Page 11, lines 7-24.
14. The method as defined in Claim 10 wherein the at least one bit design parameter comprises a number of cutting elements on at least one of the cones.	Page 13, lines 22-23.
15. The method as defined in Claim 10 wherein the at least one bit design parameter comprises a location of cutting elements on at least one of the cones.	Page 13, lines 22-23.
16. A method for balancing a volume of formation cut by each one of a plurality of roller cones on a drill bit drilling in earth formations, comprising:	Page 8, lines 20-21. Page 16, lines 14-18.
selecting bit design parameters, comprising at least a geometry of a cutting element on the drill bit;	Page 13, line 28 – Page 14, line 2.
selecting an earth formation;	Page 11, lines 14-25.
calculating from the selected bit design parameters and the selected earth formation, parameters for a crater formed when each one of a plurality of cutting elements on each of the roller cones contacts the earth formation, the parameters including at least a volume of the crater;	*See* '805 Application, Page 27, lines 8-9. *See* '466 Provisional, Flowchart.
incrementally rotating the bit, and repeating the calculating of the crater parameters for a selected number of incremental rotations;	Page 12, lines 3-14. Page 15, line 26 – Page 16, line 4.

Claims	Support in the Specification
combining the volume of each crater formed by each of the cutting elements on each of the roller cones to determine the volume of formation cut by each of the roller cones; and	Page 14, line 29 – Page 15, line 1. Page 17, lines 17-20.
adjusting at least one of the bit design parameters, and repeating the calculating the crater volume, incrementally rotating and combining the volume until a difference between the combined volume cut by each of the cones is less than the combined volume determined prior to the adjusting the at least one of the bit design parameters.	Page 12, line 27 – Page 13, line 13. Page 15, line 29 – Page 16, line 4. Page 17, line 30 – Page 18, line 2.
17. The method as defined in Claim 16 wherein the volume of each of the craters is determined by:	
determining an axial force on each of the cutting elements;	Page 11, line 14 – Page 12, line 2.
calculating, from the axial force on each of the cutting elements, an expected depth of penetration and projected area of contact between each of the cutting elements and the earth formation; and	Page 12, lines 11-14.
calculating the volume of each of the craters from the expected depth of penetration and projected area of contact.	Page 14, lines 11-16.
18. The method as defined in Claim 17 wherein the axial force acting on each of the cutting elements totals an axial force applied to the drill bit.	Page 11, lines 7-8. Page 12, lines 15-17. Page 13, lines 2-4.
19. The method of Claim 18 further comprising determining an axial force acting on each of the cutting elements with respect to a predetermined relationship between depth of penetration and axial force applied for the cutting element geometry and the earth formation.	Page 11, lines 7-24.

Claims	Support in the Specification
20. The method as defined in Claim 16 wherein the at least one bit design parameter comprises a number of cutting elements on at least one of the cones.	Page 13, lines 22-23.
21. The method as defined in Claim 16 wherein the at least one bit design parameter comprises a location of cutting elements on at least one of the cones.	Page 13, lines 22-23.
22. A method for optimizing a design of a roller cone drill bit, comprising:	Page 9, lines 11-12.
simulating the bit drilling through a selected earth formation;	Page 12, lines 18-19. Page 14, lines 25-27.
adjusting at least one design parameter of the bit;	Page 17, lines 21-23.
repeating the simulating the bit drilling; and	Page 12, lines 18-19. Page 17, lines 23-24.
repeating the adjusting and simulating until an optimized design is determined.	Page 12, lines 18-19. Page 15, line 29 – Page 16, line 4. Page 17, lines 23-24.
23. The method as defined in Claim 22 wherein the at least one design parameter comprises a parameter selected from the group of a number of cutting elements on each one of a plurality of roller cones, cutting element type, and a number of rows of cutting elements on each one of the plurality of roller cones.	Page 13, lines 22-27.
24. The method as defined in Claim 22 wherein the optimized design is determined when a rate of penetration of the bit through the selected earth formation is maximized.	*See* U.S. Patent No. 6,095,262 (the "'262 Patent)[3], Column 9, lines 53-60.

[3] The '262 Patent is incorporated by reference into the present Application. *See* Present Application, Page 9, lines 18-26.

Claims	Support in the Specification
25. The method as defined in Claim 22 wherein the optimized design is determined when axial force on the bit is substantially balanced between the roller cones.	Page 15, lines 29-30.
26. The method as defined in Claim 22 wherein the optimized design is determined when a volume of formation cut by the bit is substantially balanced between the roller cones.	Page 15, lines 29-30. Page 16, lines 17-18.
27. The method as defined in Claim 22 wherein the simulating comprises:	
selecting bit design parameters;	Page 13, line 28 – Page 14, line 2.
selecting drilling parameters;	Page 11, line 30 – Page 12, line 9.
selecting an earth formation to be represented as drilled;	Page 11, lines 14-25.
calculating from the selected parameters and the formation, parameters for a crater formed when one of a plurality of cutting elements on the bit contacts the earth formation, the cutting elements having known geometry;	*See* '805 Application, Page 27, lines 8-9. *See* '466 Provisional, Flowchart.
calculating a bottomhole geometry, wherein the crater is removed from a bottomhole surface;	Page 12, lines 10-11.
incrementally rotating the bit;	Page 11, line 30 – Page 12, line 12.
repeating the calculating of the crater parameters and the bottomhole geometry based on calculated roller cone rotation speed and geometrical location with respect to rotation of the bit about its axis.	Page 12, lines 11-14.
28. The method of Claim 27 wherein the predetermined relationship is determined by laboratory experiment.	Page 11, lines 7-24.

CONCLUSION

Applicant has made an earnest attempt to place this case in condition for allowance. For the foregoing reasons, and for other reasons clearly apparent, Applicant respectfully requests full allowance of all pending claims.

If the Examiner feels that a telephone conference or an interview would advance prosecution of the present Application in any manner, the undersigned attorney for Applicant stands ready to conduct such a conference at the convenience of the Examiner.

The Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. **50-2148** of Baker Botts L.L.P.

Respectfully submitted,

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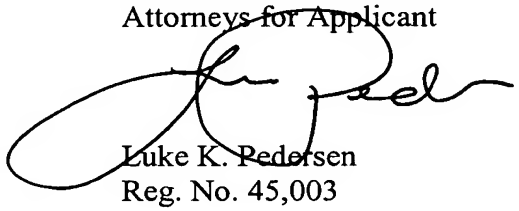

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